

PATENT SPECIFICATION

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(19)



(54) IMPROVEMENTS IN OR RELATING TO ELECTRICAL SWITCHES

(71) We, SMITHS INDUSTRIES LIMITED, a British Company, of Cricklewood Works, London N.W.2., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electrical switches. According to this invention an electrical switch comprises a housing having first and second parts sealed together to define a chamber, two spaced, rigid terminal members which project through and are sealed to the first part of the housing and which constitute fixed contacts of the switch, an operating member projecting through and movable relative to the second part of the housing, a bridging member carried by the operating member within the said chamber for bridging the said terminal members, resilient means acting to urge the bridging member out of engagement with the said terminal members, and sealing means disposed between the operating member and the second part of the housing to provide a liquid-tight seal therebetween.

The said first and second parts of the housing may be of plastics, and the said terminal members may be insert-moulded in the said first part.

The said first and second parts of the housing may be sealed together by welding.

Preferably the said sealing means comprises an O-ring. The O-ring may be carried by the operating member.

The operating member may comprise a metal portion projecting through the housing and a portion of insulating material carrying the said bridging member. If the O-ring is carried by the operating member, the O-ring may be disposed between spaced respective surfaces of the said portions of the operating member.

The bridging member may have a plurality

of elongate extensions directed away from the said terminal members.

Two electrical switches according to this invention and for use as reversing-light switches for a motor car will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal cross-section through one electrical switch;

Figure 2 is a longitudinal cross-section at right angles to the section plane of Figure 1;

Figure 3 is a longitudinal cross-section through the other electrical switch; and

Figure 4 is a longitudinal cross-section at right angles to the section plane of Figure 3.

Referring to Figures 1 and 2, the electrical switch shown therein includes a housing formed of two cup-shaped parts 1 and 2 each moulded of nylon 6.6, the housing part 1 being provided integrally with an encompassing annular flange 1a secured to an integral hexagonal projection 2a of the housing part 2 by sonic welding. If desired an optional sealing ring or washer 3 may be clamped between the two housing parts 1 and 2. The housing part 1 has insert-moulded therein two flat, rigid, terminal blades 5 that project through the base of the housing part 1 and are keyed thereto by apertures 4 stamped through the terminal blades 5 so that the terminal blades 5 are fixedly located in parallel spaced-apart planes one each side of the centre line of the housing.

A metal plunger 6 comprising a stem 7, a shoulder 8, a boss 9 and a spindle 10, has its stem 7 projecting slidably through a central bore 11 in the thick base of the housing part 2. The shoulder 8 is provided on one side with a frusto-conical surface 8a and on the other side with a radial surface 8b. The surface 8a of the shoulder 8 serves as a stop to total passage of the plunger 6 90

through the bore 11 and to some extent provides a seal against ingress of foreign matter when the plunger 6 is in its rest position shown. A shaft 12 of plastics material, for example an acetal resin, is mounted on the plunger's spindle 10 and is provided at one end with a flange 13 which, in conjunction with the radial surface 8b of the plunger's shoulder 8 and the boss 9, forms an annular groove 14 in which an O-ring seal 15 is disposed. The opposite end of the shaft 12 has secured to it a resilient contact member 17 which comprises a metal strip bent back along the length of the shaft 12 and which is provided with outwardly-bowed portions 18 each disposed further from the centre line of the housing than the inner ends of the terminal blades 5.

A helically-coiled spring 19 encompasses the shaft 12 and acts between the flange 13 and a lip 20 of the housing part 1 to urge the plunger 6 and the shaft 12 (together constituting the aforesaid operating member) outwardly of the housing part 2, and to urge the resilient contact member 17 out of bridging engagement with the inner ends of the terminal blades 5.

The external surface of the housing part 2 is provided with a screw-thread 21; and it will be appreciated from a comparison of Figures 1 and 2 that the internal configuration of the housing part 1 is of generally rectangular transverse cross-section throughout its depth (indicated by the reference numeral 22) so as to provide a degree of guidance for the edges of the resilient contact member 17.

The electrical switch shown in Figures 3 and 4 is substantially similar to that shown in Figures 1 and 2, and like parts have been given like reference numerals. The boss 9 and the spindle 10 are now however integral with the plastics-material shaft 12 instead of with the metal plunger 6. Also the resilient contact member 17 is formed from a metal stamping of generally cruciform shape. One pair of opposite limbs of this stamping provide the outwardly-bowed portions 18, and the other pair of opposite limbs 16 of the stamping are much longer and terminate in outwardly-directed flanges 16a against which one end of the spring 19 bears. The spring 19 thus serves to retain the resilient contact member 17 in position on the end of the shaft 12 so that no positive securing means need be provided. If desired, the end of the shaft 12 may be integrally provided with four peripheral, axially-directed projections (not shown) each disposed in an arris between two adjacent limbs of the resilient contact member 17 to assist location of the resilient contact member 17.

Each of the above-described electrical switches may be incorporated in a motor

car by screwing the housing part 2 into the vehicle's gear-box and connecting the terminal blades 5 in an electrical circuit to reversing lights mounted on the vehicle's rear. When reverse gear is engaged in the gear-box a mechanism within the gear-box pushes the plunger 6 and the shaft 12 inwardly of the housing towards the terminal blades 5 against the action of the coil spring 19. This motion of the shaft 12 causes the resilient contact member 17 to engage and bridge across the inner ends of the terminal blades 5 thereby to close the electrical circuit and illuminate the reversing lights, the bowed portions 18 of the resilient contact member 17 catering for any over-travel. When reverse gear is disengaged in the gear-box, the mechanism within it permits the plunger 6 to be moved outwardly of the housing under the action of the coil spring 19 moving the shaft 12 in the same direction away from the terminal blades 5. This motion of the shaft 12 simultaneously brings the resilient contact member 17 carried thereby out of bridging engagement with the inner ends of the terminal blades 5 so as to open the electrical circuit.

If either of the above-described electrical switches is to be used for other purposes (where, for example, the hot oil-laden atmosphere associated with vehicle gear-boxes is absent), the plastics material selected for the housing parts 1 and 2 can alternatively be polypropylene.

It will be appreciated that the operating member comprising the metal plunger 6 and the plastics-material shaft 12 could be replaced by a unitary structure comprising a single integral moulding of plastics material (for example, an acetal resin).

WHAT WE CLAIM IS:—

1. An electrical switch comprising a housing having first and second parts sealed together to define a chamber, two spaced, rigid terminal members which project through and are sealed to the first part of the housing and which constitute fixed contacts of the switch, an operating member projecting through and movable relative to the second part of the housing, a bridging member carried by the operating member within the said chamber for bridging the said terminal members, resilient means acting to urge the bridging member out of engagement with the said terminal members, and sealing means disposed between the operating member and the second part of the housing to provide a liquid-tight seal therebetween.

2. A switch according to Claim 1, wherein the said first and second parts of the housing are of plastics, and wherein the said terminal members are insert-moulded in the said first part.

3. A switch according to Claim 2, wherein the said first and second parts of the housing are sealed together by welding.
4. A switch according to any one of the preceding claims, wherein the said sealing means comprises an O-ring.
5. A switch according to Claim 4, wherein the O-ring is carried by the operating member.
- 10 6. A switch according to any one of the preceding claims, wherein the operating member comprises a metal portion projecting through the housing and a portion of insulating material carrying the said bridging member.
- 15 7. A switch according to Claim 5 and Claim 6, wherein the said O-ring is disposed between spaced respective surfaces of the said portions of the operating member.
- 20 8. A switch according to any one of the preceding claims, wherein a sealing member is clamped between the said first and second parts of the housing.
9. A switch according to any one of the preceding claims, wherein the bridging member has a plurality of elongate extensions directed away from the said terminal members.
10. A switch according to Claim 9, wherein the bridging member has two elongate extensions which are bowed away from the operating member whereby to enable the elongate extensions to engage the said terminal members.
11. An electrical switch substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.
12. An electrical switch substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.
- For the Applicants,
E. SWINBANK,
Chartered Patent Agent.

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2 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of
the Original on a reduced scale.
SHEET 1

FIG. 1.

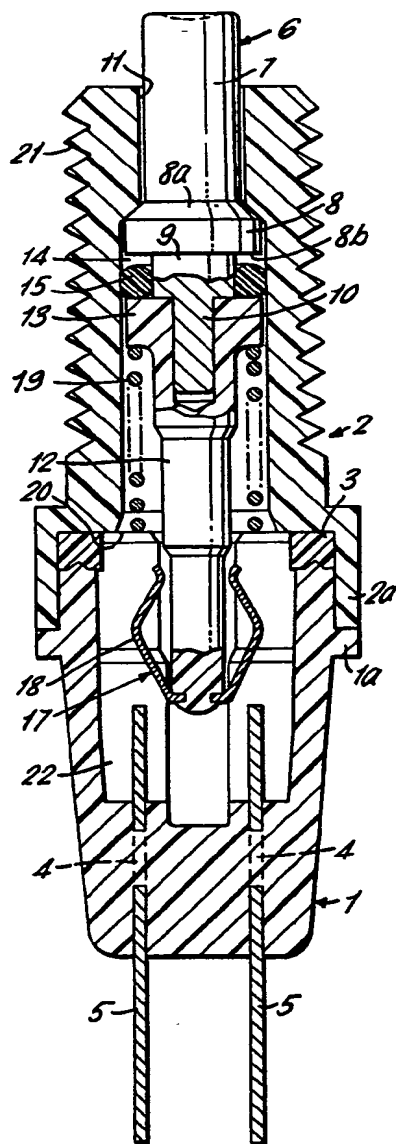


FIG. 2.

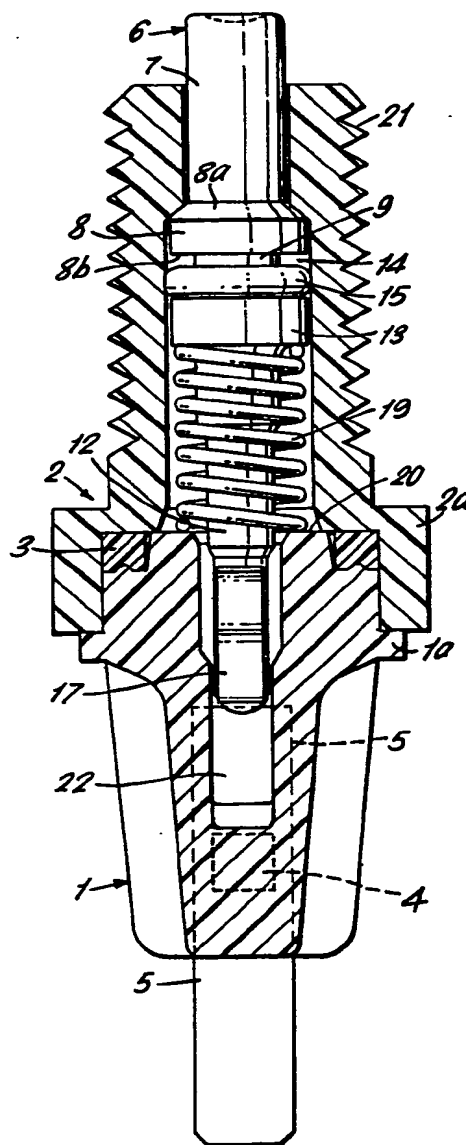


FIG. 3.

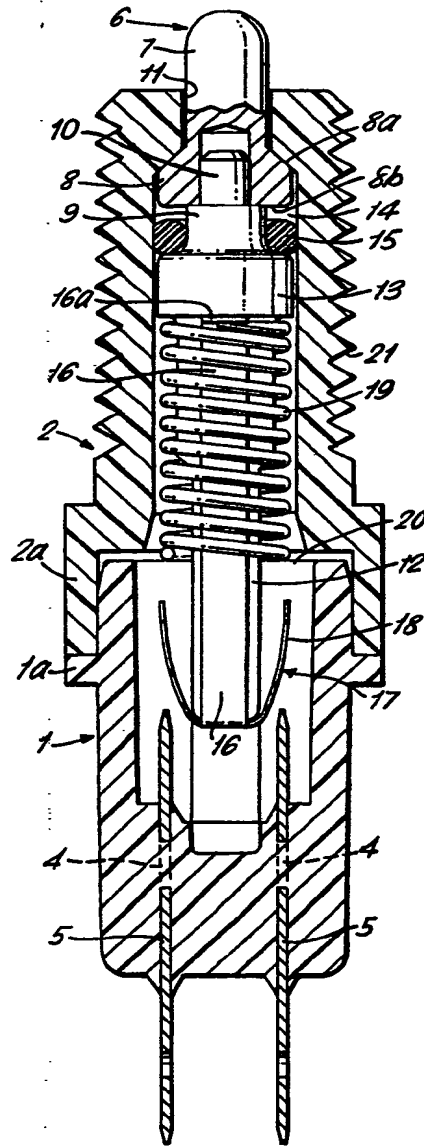


FIG. 4.

